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MOLDED CONCRETE BLOCK, AS WELL AS MOLD AND METHOD FOR MANUFACTURING A MOLDED BLOCK

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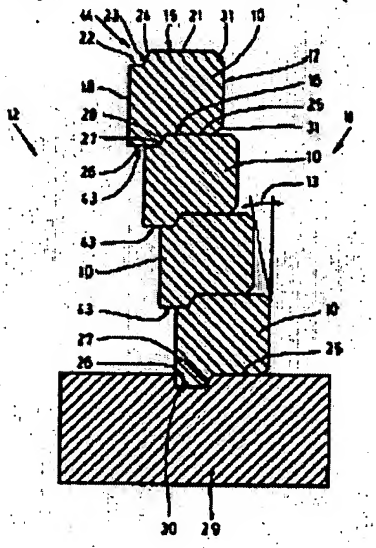
[Abstract]

The invention pertains to a molded block (10) of concrete, particularly, for constructing a retaining wall (11) that is inclined relative to the vertical toward a soil backfill (12) and that consists of layers of molded blocks (10) that are arranged one on top of another. The invention also pertains to a method for manufacturing a molded block (10) and to a mold (45) suitable for use in said method.

The top (15) and the bottom (16) of the molded blocks each respectively contain at least two support surfaces (21, 22, 25, 26) that are offset relative to one another in step-like fashion and extend parallel to one another, wherein said support surfaces engage with support surfaces (21, 22, 25, 26) of an adjacent molded block (10). A facade element that differs with respect to material composition and/or shape is arranged in the region of the upright visible surface (17) of the molded block (10) that faces away from the soil backfill (12).



The invention pertains to a molded concrete block, particularly, for constructing a retaining wall that is inclined relative to the vertical toward a soil backfill and consists of layers of molded blocks that are arranged one on top of another and the upper side and underside of which respectively contain at least two support surfaces that are offset relative to one another in step-like fashion and extend parallel to one another. The invention also pertains to a mold and a method for manufacturing such a molded block.

Conventional molded blocks for constructing retaining walls contain two support surfaces on the top and bottom that are offset relative to one another in step-like fashion, wherein said support surfaces engage with support surfaces of adjacent molded blocks within the retaining

wall. The support surfaces extend over the entire length of the molded block such that the molded block has an essentially constant cross section (EP 0 191 908).

Molded blocks of this type are manufactured in (concrete) forms that rest on a baseboard and consist of a mold frame with mold cavities that are open on the top and bottom. The molded blocks are arranged in the mold cavities with the longitudinal dimension in the upright position, i.e., the upright lateral surfaces which face one another within a retaining wall are vertical. The offset support surfaces of the molded blocks are molded by the upright form walls of the molding box.

The invention is based on the objective of improving molded blocks of the initially described type with respect to their design options. The invention also aims to disclose a suitable method for manufacturing molded blocks in an improved concrete form.

In order to realize this objective, the molded block according to the invention is characterized by the fact that an upright visible side which faces away from the soil backfill is provided with a facade element that differs with respect to its material composition and/or shape.

The arrangement of a facade layer is neither known nor possible on conventional molded blocks of the described type. Such a facade element is advantageous for example, only if one lateral surface, particularly, the visible side of the molded block, is subject to design requirements or special technical requirements that are associated with increased manufacturing expenditures.

Another peculiarity of the invention pertains to the method for manufacturing such molded blocks. The method according to the invention is characterized by the fact that the molded block is placed in the mold cavity of the mold such that the visible side which faces away from the soil backfill points up, and by the fact that the visible side is molded with a ram.

The design options of the visible side of the molded blocks are improved due to this arrangement of the molded blocks in the mold cavities. This also makes it possible to realize arbitrary depressions and/or projections in the region of the visible side of the molded blocks.

Another peculiarity pertains to the mold for manufacturing the molded blocks according to the invention. The mold according to the invention is characterized by the fact that

a) upright walls of the mold cavities contain recesses that are open toward the bottom and make it possible to mold projections on lateral surfaces, particularly, on the top and/or bottom of the molded blocks, and by the fact that

b) profiles protrude into the mold cavities on the mold walls that are located opposite of the mold walls provided with the recesses, wherein said profiles consist, in particular, of mold ridges that are arranged on a drawing sheet and make it possible to mold depressions on lateral surfaces, in particular, on the top and/or bottom of the molded blocks.

This development of the mold according to the invention makes it possible to

manufacture molded blocks with support surfaces that are offset relative to one another despite the altered relative position of the molded blocks in the mold cavities.

Another advantage of the mold is that it allows the manufacture of molded blocks according to the invention, the length of which is limited only by the length of conventional block manufacturing machines. Retaining walls can be built cost-effectively within a short period of time from longer molded blocks of this type, particularly, by means of a mechanized installation.

Other details of the invention are discussed in greater detail below with reference to embodiments that are illustrated in the drawings. Shown are:

Figure 1, a section through a retaining wall consisting of molded blocks according to the invention;

Figure 2, a molded block according to Figure 1 in the form of an isometric representation;

Figure 3, a schematic section through a mold;

Figure 4, a top view of the mold according to Figure 3;

Figure 5, a section through the mold according to Figure 4 along line V-V;

Figure 6, a top view of a drawing sheet according to Figure 3;

Figure 7, a section through a drawing sheet according to Figure 6 along line VII-VII, and

Figure 8 to Figure 12, other embodiments of the molded block according to the invention in the form of enlarged partial sections through a retaining wall according to Figure 1.

The molded blocks 10 shown in the figures serve for constructing retaining walls 11 with a soil backfill 12 on one side. The retaining wall 11 is arranged in a plane that is inclined toward the soil backfill 12. The angle of inclination 13 relative to an imaginary vertical plane may be up to 30°, wherein said angle is chosen as 12° in the embodiment shown. The molded blocks 10 consist of an elongated base body 14 with an upper side 15 and an underside 16, a visible side 17 that faces away from the soil backfill 12, a rear side 18 that faces the soil backfill 12 and two lateral end faces 19, 20. A chamfer 31 may be arranged at the transition from the visible side 17 to the upper side 15 and the underside 16. The upper side 15 and the underside 16 correspond to one another in all embodiments, specifically such that the molded blocks 10 can be form-fit one on top of another in the retaining wall 11. For this purpose, the molded block 10 contains a depression 44 in the transition region from the upper side 16 [sic; 15] to the rear side 18 and a corresponding projection 43 at the transition from the underside 16 to the rear side 18.

The upper side 16 [sic; 15] of the molded block 10 consists of at least two support surfaces 21, 22 that are located in offset parallel planes. The support surface 22 [sic; 21] of the upper side 15 with respect to the visible side 17 is offset upward relative to the support surface 22 of the upper side 15, such that a shoulder 23 with an inclined stopping face 24 is formed. In the embodiment shown, this stopping face is inclined relative to the support surfaces 21, 22 by an

angle of 45°. The offset between the support surfaces 21, 22 forms a depression 44. The underside 16 is realized correspondingly with a projection 43. The support surface 25 of the underside 16 with respect to the visible side 17 is offset upward relative to support surface 26 of the underside 16, such that a shoulder 27 with an inclined stopping face 28 is formed.

A retaining wall 11 is constructed by installing the molded blocks 10 in such a way that the support surfaces 21, 22 and the stopping face 24 of one molded block 10 are form-fitted on the support surfaces 25, 26 and the stopping face 28 of an adjacent molded block 10. The retaining wall 11 is supported on a foundation 29 that contains a recess 30. This recess is realized such that the support surfaces 25, 26 and the stopping face 28 of the bottom molded block 10 lie against the foundation 29.

Figure 2 shows a molded block 10 according to Figure 1 in the form of an isometric representation. The molded block 10 contains a chamfer 31 in the transition region from the upright end faces 19 to the upper side 15 and the visible side 17, in the region of lateral edges 42. The molded block 11 also contains a recess or slot 32 that is located approximately in the longitudinal center and extends transverse to the longitudinal axis 33 of the molded block 11 on its visible side 17 and upper side 15. It would also be possible to provide several slots 32 that, for example, are uniformly distributed over the length of the molded block 10. The length of the molded block 10 may be 90 cm, for example. The slot 32 may have an approximately triangular cross section, although in principle it would be conceivable to use other cross sections, for example, rectangular, circular, oval, etc.

Figure 8 to Figure 11 show other embodiments of the molded block 10 according to the invention which are realized analogously to the molded block 10 according to Figure 1. In this case, the molded block 11 [sic; 10] consists of a base body 14 and a facade element 34 arranged in the region of the visible side 17. Figures 8-11 show a vertical section at the elevation of the slot 32 shown in Figure 1.

In Figure 8, the facade element 34 has a trapezoidal cross section and adjoins the base body 14 in the region of an inclined contact surface 35. Here, the upright front side 36 that faces away from the base body 14 forms the predominant portion of the visible surface 17 of the molded block 10. The facade element 34 contains a trapezoidal recess 37 in its lower region, at the transition to the underside 16, such that the base body 14 is visible in this region. In this embodiment, the depth of the slot 32 increases from the upper side 15 to the underside 16, such that the slot 32 extends up to the contact surface 35, i.e., over the depth of the facade element 34. However, in principle, the slot 32 may also have a smaller depth that does not correspond to the progression of the contact surface 35.

When constructing retaining walls 11 from molded blocks 10 according to Figure 8, only the support surfaces 21, 22 and the stopping face 24 of the base body 13 of a molded block 10

are supported on corresponding support surfaces 25, 26 and the stopping face 28 of an adjacent molded block 10. The upper side 38 of the facade element 34 is not subjected to the weight of the molded blocks 10.

The facade element 34 may also consist of a different material or have a different composition than the base body 14. For example, the facade element 34 may contain a higher percentage of colorants than the base body 14, in particular, 5%. In contrast, the base body 14 contains, in particular, 0.5%-1% colorants.

Figure 9 shows a molded block 10 that is realized analogously to Figure 8 and provided with a facade element 34, but which has a curved contour in the region of the visible side 17. Other differences compared with the embodiment according to Figure 8 can be seen in that the facade element 34 extends over part of the upper side 15 of the base body 14, and in that the facade element contains a recess 37 at the transition to the upper side 15.

Figure 10 shows another embodiment of the molded block 10 according to the invention. Here, the contact surface 35 is curved at the transition from the visible side 17 to the upper side 15. In addition, the facade element 34 is arranged such that the upper side 38 lies in a plane with the upper side 15 of the base body. The slot 32 has a constant depth in this embodiment.

Figure 11 shows another embodiment that essentially corresponds to the embodiment according to Figure 8, but where the facade element 34 has a triangular cross section. In this embodiment, a few dimensions of the molded block 10 are illustrated in mm. However, the molded block 10 is not limited to the dimensions shown.

Figure 12 shows a molded block 10 without a facade element 34. In this embodiment, the contour of the retaining wall 11 is defined by the visible side 17 of the base body 14 which contains two circular, horizontally extending beads 40 in this embodiment. These beads are arranged at the transitions from the visible side 17 to the upper side 15 and the underside 16. A terminal block 41 is provided as the upper limit of the retaining wall 11. This terminal block has a smaller height than the molded block 10 and a contour similar to that of the molded block 10 in the region of the visible side 17. The terminal block 41 is realized in such a way that its underside 16 engages with the support surfaces 21, 22 and the stopping face 24 of the molded block 10 situated underneath. In principle, the terminal block 41 may also be installed analogously in retaining walls 11 that consist of molded blocks 10 according to the embodiment shown in Figure 8 to Figure 11.

The molded block 10 shown in this embodiment does not contain a slot 32. However, in principle, the molded block 10 shown may also contain a facade element 34 and/or one or more slots 32. It would also be conceivable to realize molded blocks 10, the visible side 17 of which has a more complex contour than that of the molded blocks 10 shown, for example, with several horizontal shoulders, semicircular recesses, or an undulating contour.

Another peculiarity pertains to a novel method for manufacturing the molded blocks 10 shown in a mold 45 according to the invention.

Figure 3 shows a schematic representation of the mold 45 according to the invention. The molded blocks 10 are manufactured in a mold 45 that contains a series of mold cavities 46 that are open on the upper and the lower side and limited by mold walls 49. On the underside, the mold cavities 46 are closed with a baseboard 47. The mold cavities 46 are filled with pourable concrete. Rams 48 are moved into the individual mold cavities 46 from the top in order to provide an upper limit for the molded blocks 10. After molding the blocks 10, the mold 45 is removed from the molded blocks 10 by pulling the mold vertically upward, and the molded blocks 10 lying on the baseboard 47 are transported.

In the method according to the invention, the molded block 10 lies in the mold 45 in such a way that the visible side 17 of the molded block 10 points up in the direction of the ram 48. Thus, the longitudinal axis 33 of the molded block 10 lies parallel to the plane of the baseboard 37 [sic; 47]. The upper side 15 and the underside 16 of the molded block 10 point in the direction of the mold walls 49 of the mold cavity 46. The visible side 17 of the molded blocks 10 is formed by moving rams 48 into the mold cavities 46 from the top. The rear side 18 of the molded block 10 rests on a drawing sheet 50 or a plate-shaped, thin-walled element that can be pulled out from the side after molding the blocks 10 such that the molded blocks 10 lie on the underlying baseboard 47. The drawing sheet 50 has the function of molding the projections 43 of the molded blocks 10 which are limited by the support surfaces 22 and the stopping faces 24. For this purpose, upright mold ridges 52 are arranged on the upper side of the drawing sheet 50 such that they extend in the direction of the drawing movement indicated by the arrow 51 (Figure 4). These mold ridges have a constant trapezoidal cross section and correspond to the cross section of the depression 44. The molded ridges 52 have an inclined surface 53 and a lateral surface 54 which face the molded block 10 and mold the stopping faces 24 and the support surfaces 22. For this purpose, the mold ridges 52 extend directly adjacent to a mold wall 49.

In order to mold the projections 43 that are limited by the stopping faces 28 and the support surfaces 26 on the underside 16 of the molded blocks 10, oppositely arranged mold walls 49 contain recesses 59 that are open on the lower side and have a corresponding cross section. The recesses are limited by the inclined surface 55 and the lateral surface 56 that serve for molding the stopping faces 28 and the support surfaces 26.

In order to mold the visible side 17 of the molded block 10 in accordance with the embodiments shown in Figure 2 and Figure 8 to Figure 13, the underside of the ram 48 is provided with a ram plate 57. The ram plate 57 is realized in accordance with the visible side 17 to be molded. Figure 3 shows a ram plate 57 suitable for manufacturing the visible side 17 of the molded block 10 shown in Figure 2. For this purpose, triangular projections 58 are arranged in

the lateral edge region of the ram plate 57 in order to mold the chamfers 31. The ram plate 57 may contain additional projections 58 that can be arranged arbitrarily in order to mold one or more slots 32. The mold walls 49 may contain other projections and/or recesses in order to form slots 32 that extend transverse to the longitudinal axis 33 of the molded block 10 or projections and/or depressions on other lateral surfaces of the molded block 10.

Figure 4 shows a top view of the mold 45 according to the invention which comprises three mold cavities 46. The mold cavities 46 are limited on all sides by the mold walls 49. According to Figure 5, three mold walls 49 that extend parallel to the longitudinal axis of the molded block 10 are provided with a recess 59 on one side. These recesses are limited by the inclined surface 55 and the lateral surface 56 and serve for producing the stopping face 28 and the support surface 26 on the underside 16 of the molded block 10.

Figure 5 shows a plan view of the drawing sheet 50 that belongs to the mold 45 according to Figure 4. Analogous to the number of mold cavities 46, the drawing sheet 50 is provided with three mold ridges 52. The mold ridges 52 are arranged on the drawing sheet 50 in such a way that they extend parallel to the drawing direction indicated by the arrow 51, namely directly adjacent to a mold wall 49 in order to mold the upper sides 15 and undersides 16 of the molded blocks 10.

List of reference symbols

10 Molded block
11 Retaining wall
12 Soil backfill
13 Angle of inclination
14 Base body
15 Upper side
16 Underside
17 Visible side
18 Rear side
19 End face
20 End face
21 Support surface
22 Support surface
23 Shoulder
24 Stopping face
25 Support surface
26 Support surface

27 Shoulder
28 Stopping face
29 Foundation
30 Recess
31 Chamfer
32 Slot
33 Longitudinal axis
34 Facade element
35 Contact surface
36 Front side
37 Recess
38 Upper side
39 Underside
40 Bead
41 Terminal block
42 Lateral edge
43 Projection
44 Depression
45 Mold
46 Mold cavity
47 Baseboard
48 Ram
49 Mold wall
50 Drawing sheet
51 Arrow
52 Mold ridge
53 Inclined surface
54 Lateral surface
55 Inclined surface
56 Lateral surface
57 Ram plate
58 Projection
59 Recess

Claims

1. Molded block (10) of concrete, particularly, for constructing a retaining wall (11) that is inclined relative to the vertical toward a soil backfill (12) and that consists of layers of molded blocks (10) that are arranged one on top of another and the top (15) and bottom (16) of which blocks respectively contain at least two support surfaces (21, 22, 25, 26) that are offset relative to one another in step-like fashion and extend parallel to one another, characterized by the fact that an upright visible surface (17) that faces away from the soil backfill (12) contains a facade element (34) that differs with respect to its material composition and/or shape.

2. Molded block according to Claim 1, characterized by the fact that the facade element (34) contains recesses (32) and/or projections.

3. Molded block according to Claim 2, characterized by the fact that the recesses (32) and/or projections extend transverse to the longitudinal axis (33) of the molded block (10).

4. Molded block according to Claim 2 or one of the following claims, characterized by the fact that the recesses (32) and/or projections are located a certain distance from the upright lateral edges (42) of the molded block (10).

5. Molded block according to Claim 4, characterized by the fact that the recesses (32) and/or projections are located in the center of the end face (17).

6. Molded block according to Claim 2 or one of the following claims, characterized by the fact that other lateral surfaces (15, 16) contain recesses (32) and/or projections that extend transverse to the longitudinal axis (33) of the molded block (10).

7. Molded block according to Claim 1 or one of the following claims, characterized by the fact that the facade element (34) contains a higher percentage of colorants than the base body (14) of the molded block (10).

8. Molded block according to Claim 7, characterized by the fact that the facade element (34) contains, in particular, 5% colorants, whereas the base body (14) contains, in particular, between 0.5% and 1% colorants.

9. Molded block according to Claim 1 or one of the following claims, characterized by the fact that the molded block (10) has a length of more than approximately 35 cm, in particular, 90 cm.

10. Method for manufacturing a molded block (10) of concrete, in particular, for constructing a retaining wall (11) that is inclined relative to the vertical toward a soil backfill (12) and that consists of layers of molded blocks (10) that are arranged one on top of another and the top (15) and bottom (16) of which respectively contain at least two support surfaces (21, 22, 25, 26) that are offset relative to one another in step-like fashion and extend parallel to one another, characterized by the fact that the molded block (10) placed in a mold (45) such that the

visible side (17) that faces away from the soil backfill (12) points upward, and by the fact that the visible side (17) is molded by a ram (48).

11. Method according to Claim 10, characterized by the fact that the ram (48) contains projections (58) and/or recesses for molding the recesses (32) and/or projections in the region of the visible side (17) of the molded block (10), wherein, in particular, said recesses and/or projections are directed transverse to the longitudinal axis (33) of the molded block (10).

12. Method according to Claim 10 or 11, characterized by the fact that the molded block (10) is molded such that its longitudinal axis (33) extends transverse to the plane of a baseboard (47) situated underneath the mold (45).

13. Mold for manufacturing a molded block (10) of concrete, in particular, for constructing a retaining wall (11) that is inclined relative to the vertical toward a soil backfill (12) and that consists of layers of molded blocks (10) that are arranged one on top of another and the top (15) and bottom (16) of which respectively contain at least two support surfaces (21, 22, 25, 26) that are offset relative to one another in step-like fashion and extend parallel to one another, characterized by the fact that a mold (45) which is open on the upper side is provided with a ram (48) that is moved into the upper side and thus molds the visible side (17) of the molded block (10).

14. Mold according to Claim 13, characterized by the fact that the mold (45) contains a retractable drawing sheet (50) that is arranged beneath the mold and contains mold ridges (52) for molding the depressions (44), particularly, in the region of the top (15) and the rear side (18) of the molded block (10).

15. Mold according to Claim 13 or one of the following claims, characterized by the fact that mold walls (49) of the mold (45) contain recesses (59) on one side, wherein said recesses serve for molding the projections (43), particularly, in the region of the bottom (16) and the rear side (18) of the molded block (10).

16. Mold according to Claim 13 or one of the following claims, characterized by the fact that mold walls (49) contain vertically directed projections and/or recesses that serve for molding the recesses (32) and/or projections, in particular, in the region of the upper side (16) [sic] and the underside (17) [sic] of the molded block (10).

17. Mold according to Claim 13 or one of the following claims, characterized by the fact that the molded block (10) can be manufactured in the mold (45) horizontally, so that it is possible to manufacture longer molded blocks (10), particularly molded blocks with a length exceeding 35 cm.

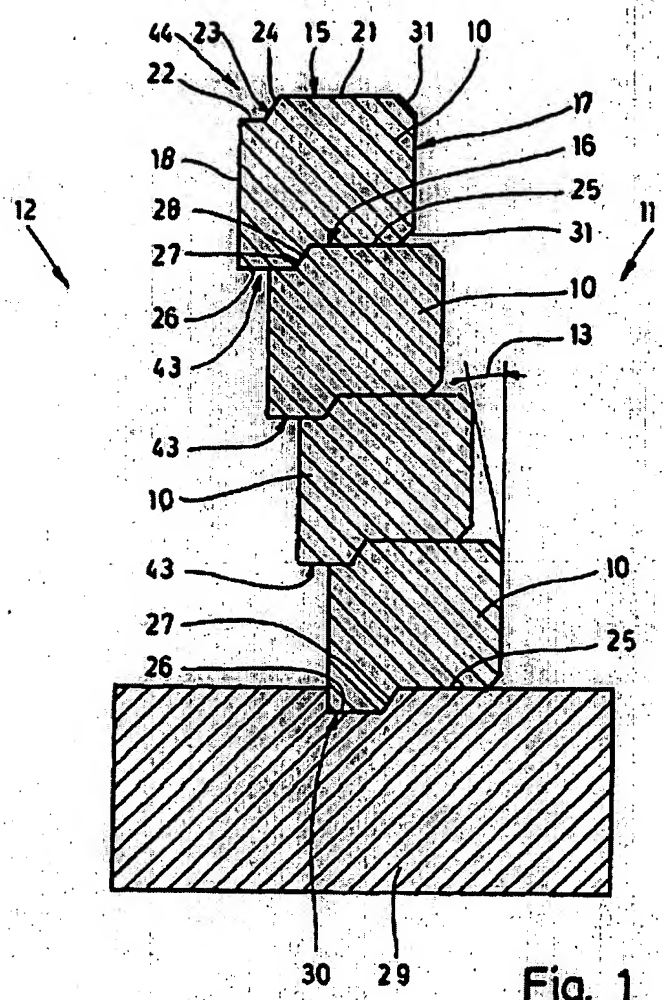

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Fig. 1

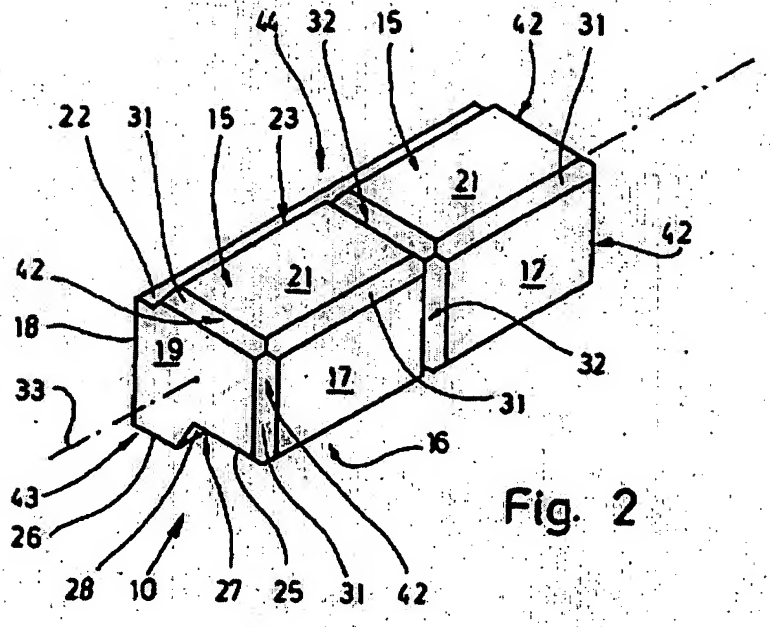
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Fig. 2

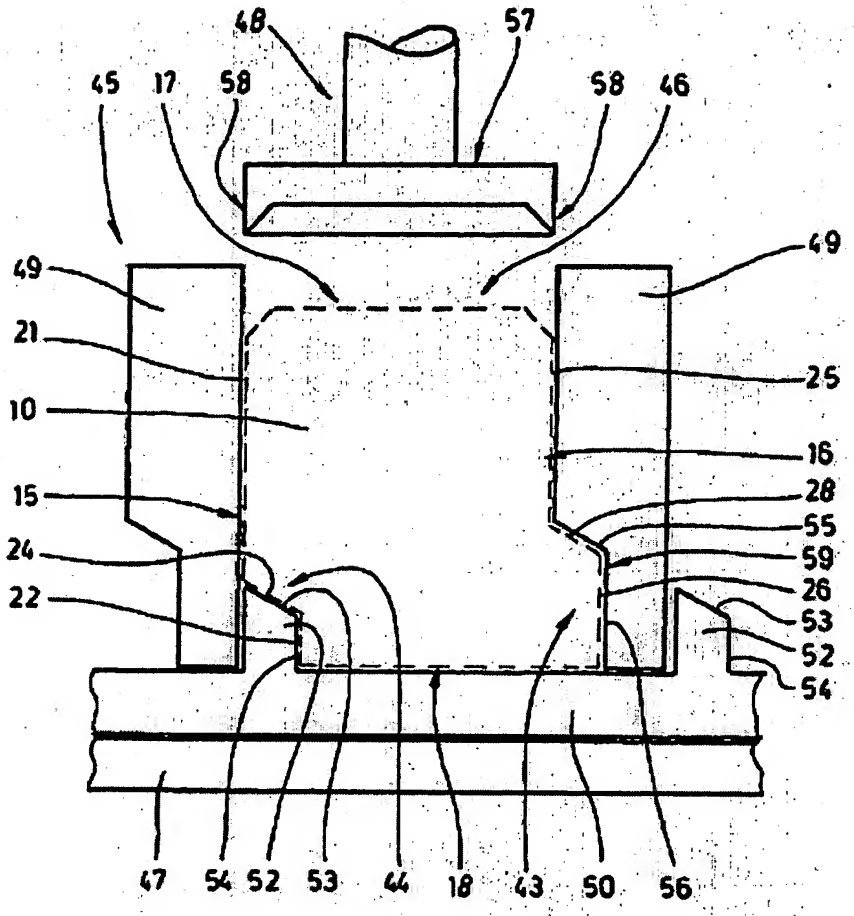
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Fig. 3

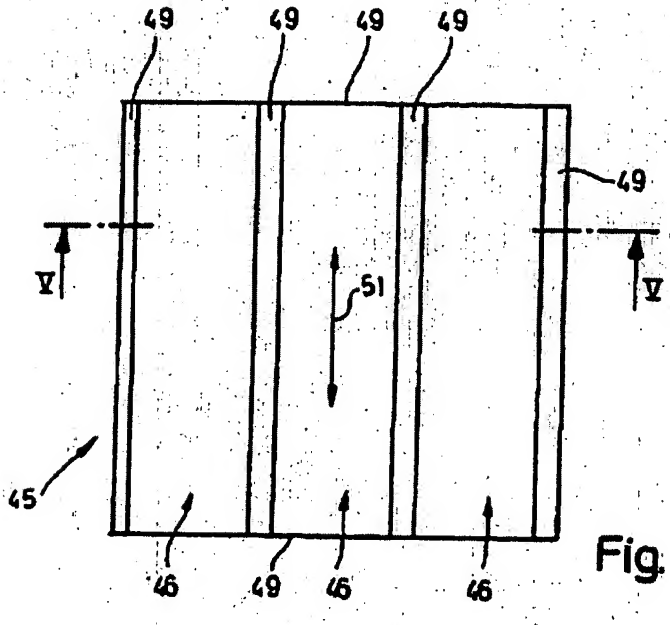
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Fig. 4

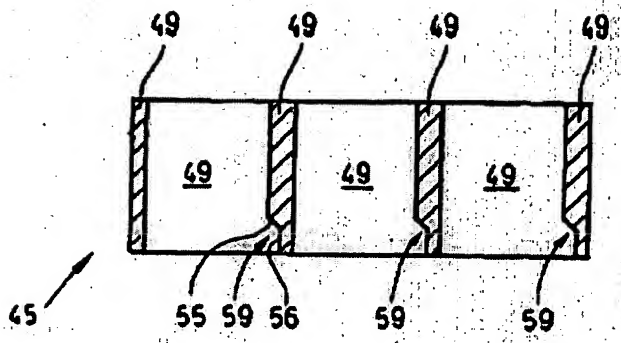

Fig. 5

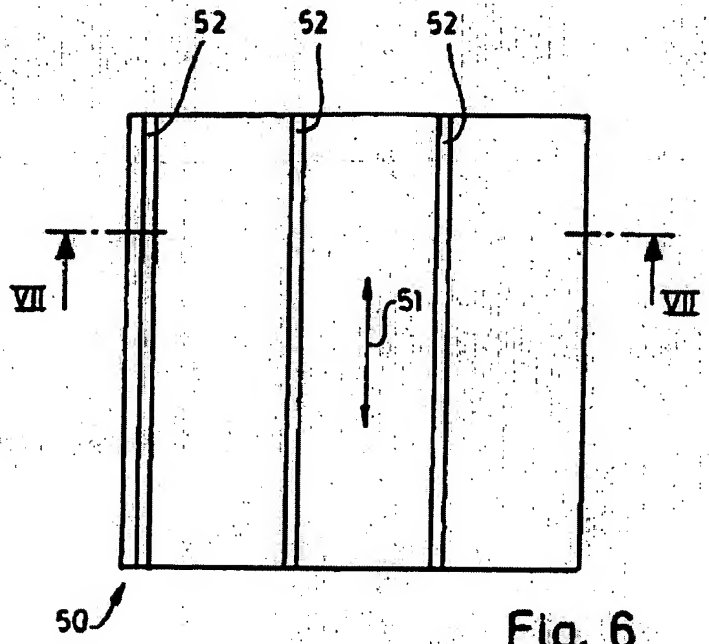

Fig. 6

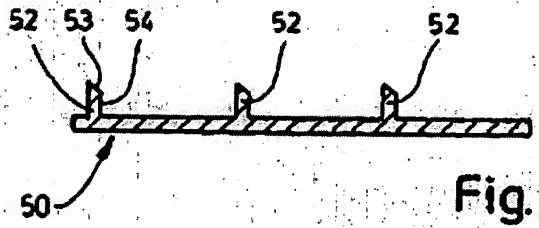

Fig. 7

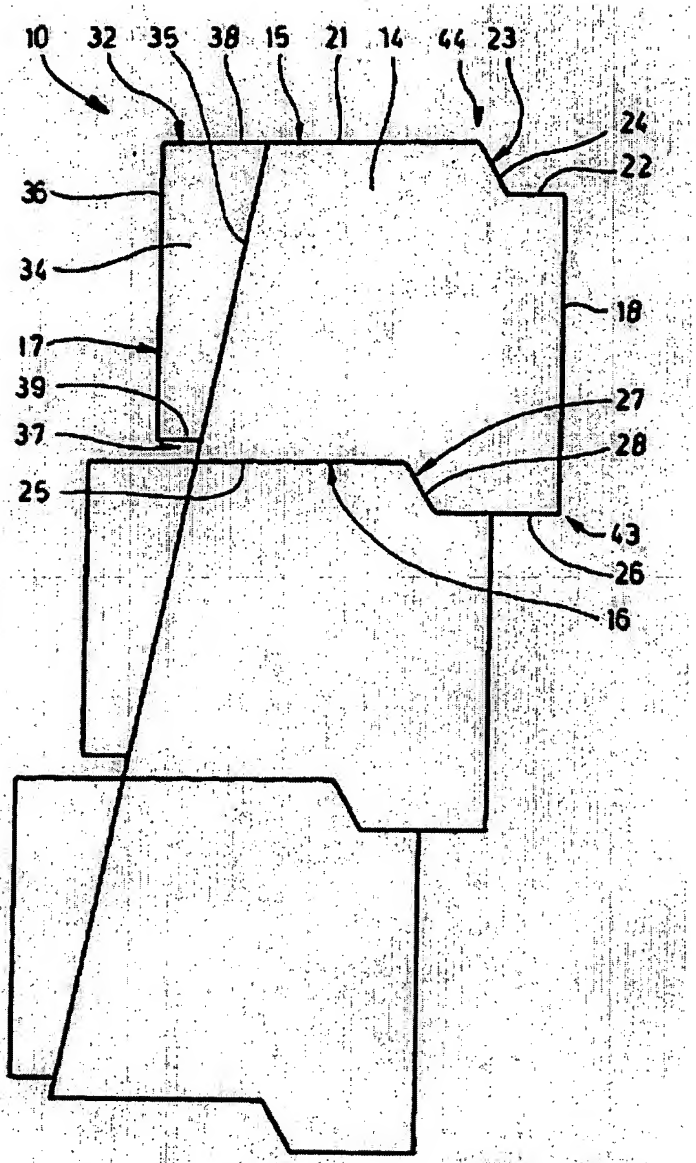

Fig. 8

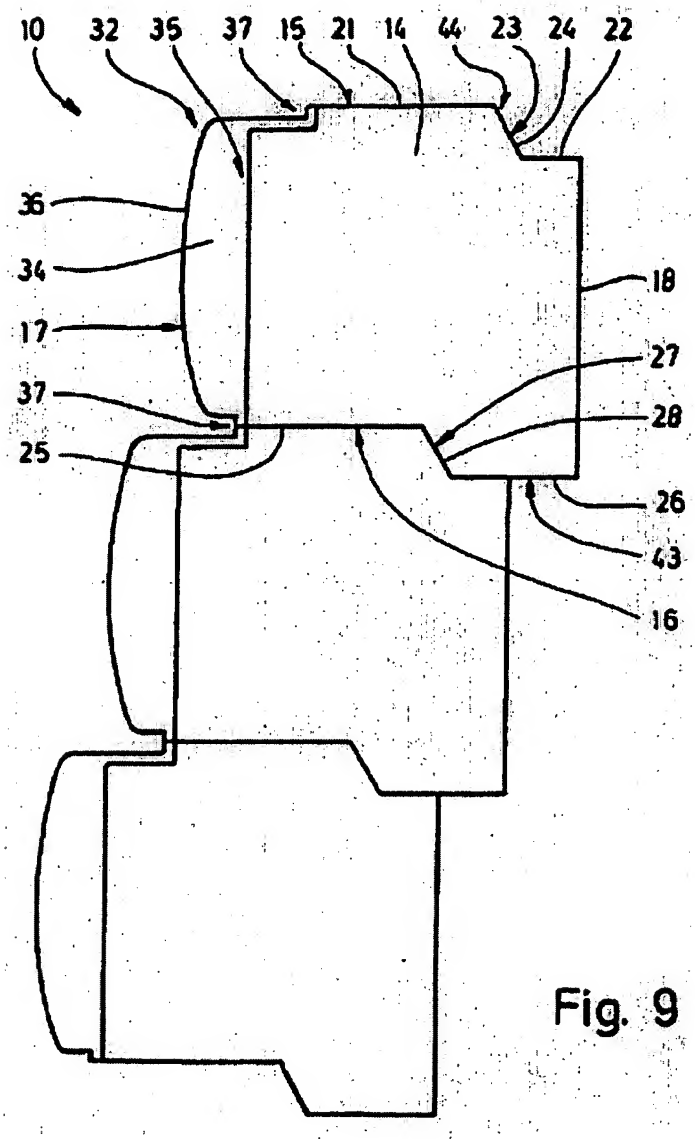

Fig. 9

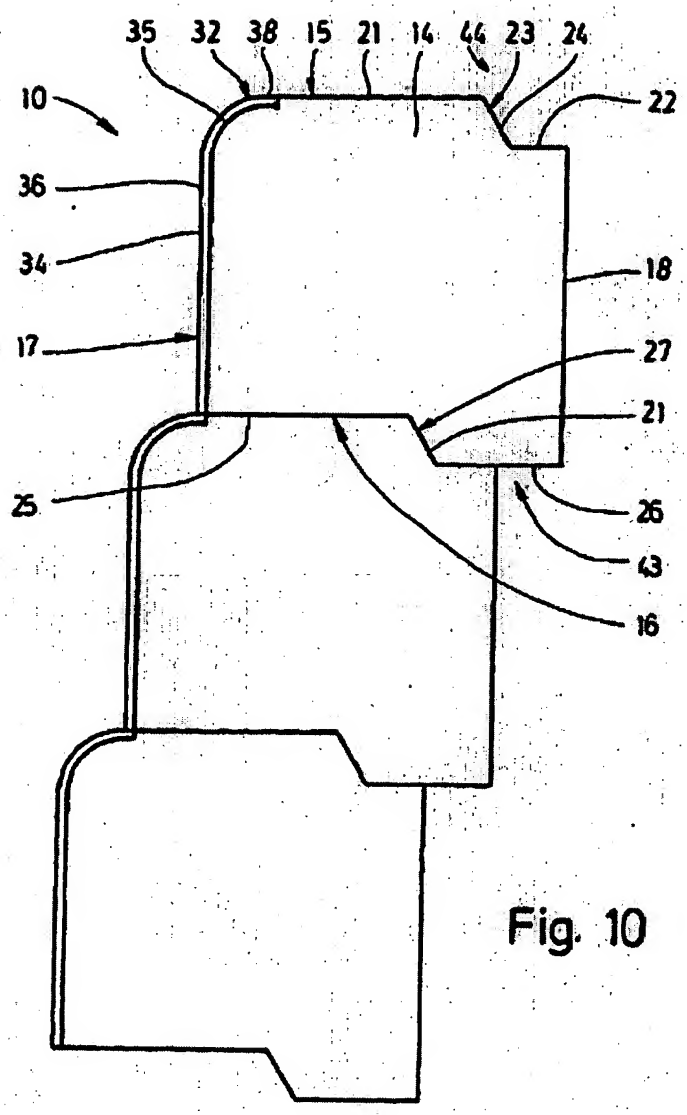

Fig. 10

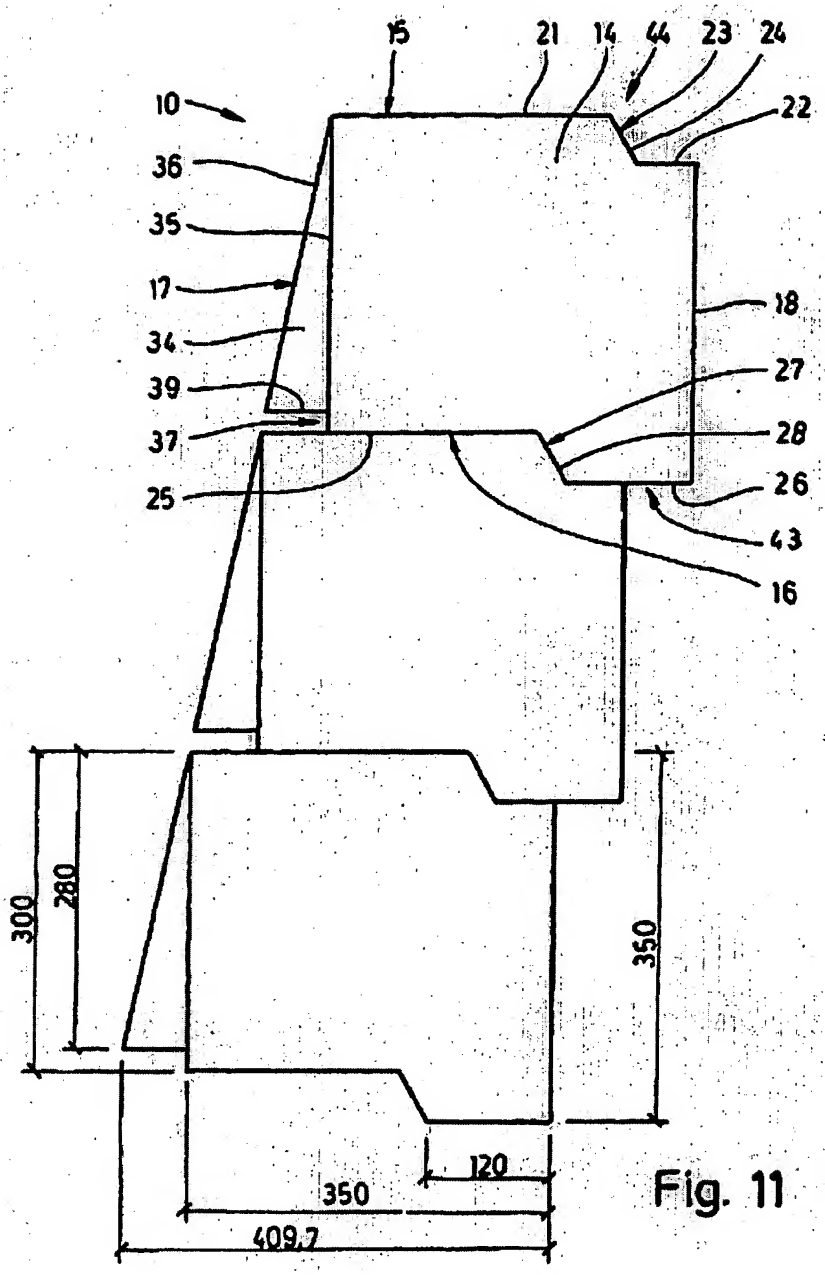
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Fig. 11

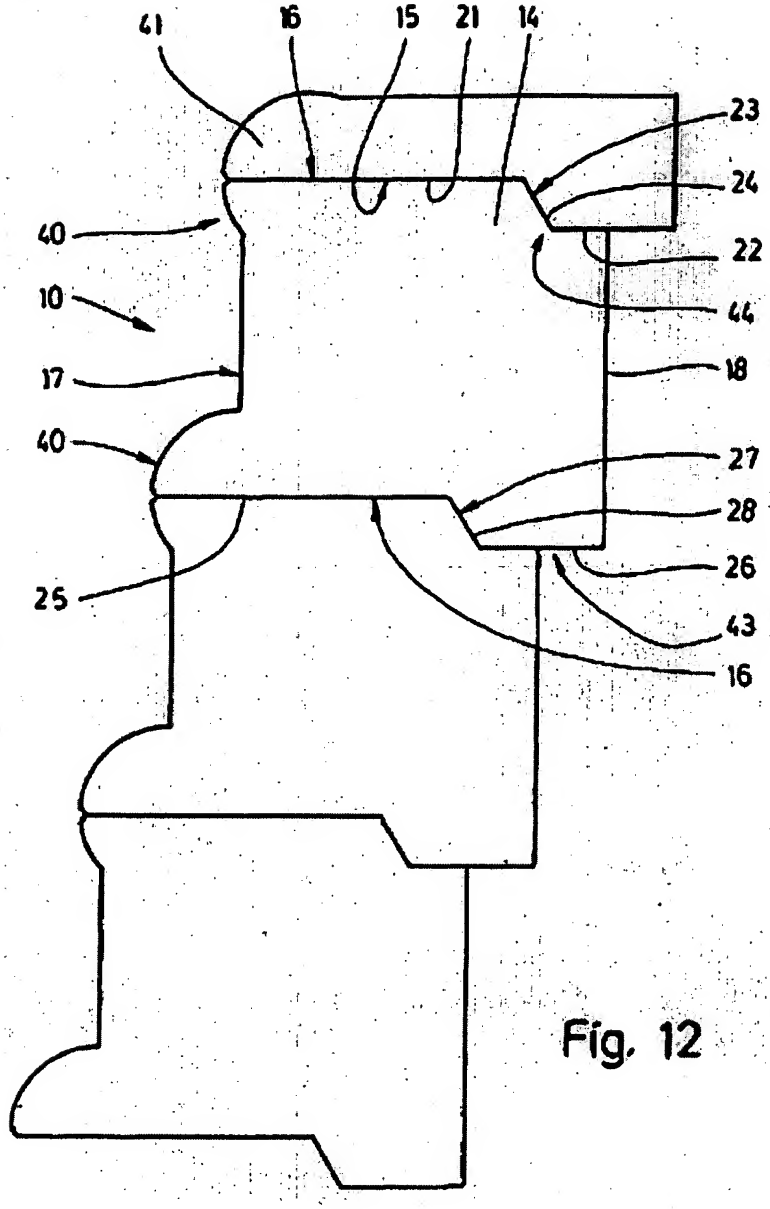

Fig. 12